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A Six-Year Follow-Up Comparing a Group of Students Who Attended Kindergarten and a Group That Did Not

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A SIX-YEAR FOLLOW-UP COMPARING A GROUP OF STUDENTS WHO ATTENDED KINDERGARTEN AND A GROUP THAT DID NOT

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FOREWARD

The writer would like to acknowledge the assistance given him by Dr. DiPietro in the use and calculation of statistical information.

The writer also appreciates the cooperation of Mr. Paul Seitsinger, Unit Superintendent, Mr. John Dively, Jefferson Junior High School Principal, and the Guidance Counselors at Jefferson Junior High School, Mrs. Eleanor McCabe and Mr. Jerry Gudauskas.

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CHAPTER I

INTRODUCTION

This study was made to compare two groups of students; one group that attended kindergarten and another group that did not attend kindergarten. The two groups were compared on the basis of certain subject letter grades, achievement test scores, I.Q. test scores, and letter grades in Conduct and Application.

A. Purpose

There is a great deal of interest in the value of kindergartens. The question of whether kindergarten should be included in the public school system has been and is being debated in many communities. School districts that have kindergartens sometimes consider eliminating them when services must be curtailed for financial reasons. The specific purpose of this study was to see if there is a significant difference in certain areas of two selected groups of students; one group that attended kindergarten, and another group that did not.

B. Procedure

The students selected for the study were seventh and eighth grade students at Jefferson Junior High School, Charleston, Illinois, during the academic year, 1965-66. From this group, students were eliminated who had not attended one of the grade

schools in Charleston their first six grades in school. The remaining students were then divided into two groups; one group that had attended kindergarten in Charleston, another group that had not. The names of the children who attended kindergarten during the academic year 1958-59 were obtained from the three people who operated private kindergartens in Charleston at that time. There was no public kindergarten in Charleston then. The number of students in the group who attended kindergarten was 27; the number of students in the group who did not attend kindergarten was 126.

The students were compared in the following areas:

1. Letter grades in Reading, Arithmetic and Spelling in grades 1, 3, and 6.
2. Letter grades in Conduct and Application in grades 1, 3, and 6.
3. Achievement test scores in Reading Comprehension and Vocabulary and Arithmetic Fundamentals and Reasoning in grades 2, 4, and 6. Scores reported as grade equivalents.
4. I.Q. test scores in grades 1, 3, and 5.

The grades and tests scores were obtained from the students' cumulative records at Jefferson Junior High School.

A difference of some magnitude was expected to be found between the two groups if only a difference due to chance. In order to determine if there was a significant difference between the two groups, two statistical tests were employed. In comparisons involving letter grades, the chi-square test was

used. "The chi-square test is a simple and direct test of significance. It is suitable for most cases in which the observations can be classified into discrete categories and treated as frequencies."[1] Chi-square is designated by the symbol X^2. The quantity chi-square is claculated by the formula: $X^2 = \sum \frac{(O-E)}{E}$.[2] In the calculations, all plus and minus signs were disregarded.

In comparisons involving numerical scores, the t test was employed. "The test is the most commonly used method of testing the significance of the difference between two sample means."[3] The quantity t is calculated by the formula:

$$t = \frac{\bar{x} - \bar{y}}{\sqrt{n_x s_x^2 + n_y s_y^2}} \qquad \sqrt{\frac{n_x n_y (n_x + n_y - 2)}{n_x + n_y}}$$ [4]

C. Limitations

The results of this study are valid only for the group compared in the study. Also the reader should realize that many factors which no doubt influenced the results were not measured. Such factors as the parents' socio-economic status, the educational level of the parents, the number of books, magazines and educational toys in the home, in general the educational stimulus of the child's environment was not considered in this study.

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[1] McCollough and VanAtta, Statistical Concepts, New York: McGraw-Hill Book Company, 1963.

[2] Ibid.

[3] Ibid.

[4] Hoel, Paul G., Introduction to Mathematical Statistics, John Wiley and Sons, Inc., New York: 1954.

CHAPTER II

RELATED RESEARCH AND INFORMATION

A. Related Research

A great deal of writing has been done about kindergartens. Most of the writing is concerned with activities of kindergarten programs. A relatively small amount of writing has been done on the value of kindergartens and research to determine the value of kindergarten.

One educator, Robert L. Hillerich, asks for more evaluation of kindergarten in an article entitled "Dare We Evaluate Paradise?" Mr. Hillerich says:

> For many years professional people, inside and outside of education, have examined what is happening to children in schools. Investigation of content and teaching method have taken place from college to first grade. However, seldom has the spector of research managed to get beyond the front door of kindergarten.

After discussing the possibility of beginning reading instruction in kindergarten, Mr. Hillerich concludes:

> In essence, I suggest that we maintain much of the good we now have in kindergarten, but also that we investigate how much more we should be doing. After all, it is as bad--perhaps worse--to have the bright kindergartener wait until that magic moment in the first grade as it is for the slow to be exposed to that for which he is not ready. If we dare to till the sacred ground, we may accomplish, rather than merely talk about, our desire to meet the variety of needs and abilities in kindergarten.[1]

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[1]Hillerich, Robert L., "Dare We Evaluate Paradise?" Illinois Education, April, 1963.

Other educators feel that the values of kindergarten cannot necessarily be objectively evaluated. Dr. Ethel Thompson commented recently:

> For many years the students of early childhood education have been proclaiming unsuccessfully the importance of the early years in the intellectual development of a person. Unfortunately, they were not able to produce the kind of evidence demanded. Can the child who attends kindergarten make a higher score on the standardized reading test? Is there less retardation among children who have kindergarten education? How does scholastic achievement relate to attendance in kindergarten?
>
> Kindergarten teachers and students of early childhood resent this kind of evaluation of the learning experiences that a child receives in a kindergarten program. There are many learnings above and beyond those that are recorded by a mark. What about rational thinking, ability to solve problems, awareness, and curiosity about our world, independence, and creativity.[2]

Several educators felt that kindergarten can be a valuable experience but if kindergarten is to survive and flourish, it will have to be evaluated and revised to meet the needs of today's five-year olds. Also, means of showing the public the value of kindergarten need to be devised.

Dr. Rodney Tillman recently stated:

> It is often stated that the kindergarten teacher must be concerned with 'the emotional, intellectual, physical, and social development of each child.' This has little meaning, however, unless specific goals for which data can be gathered, are established for each area. Experienced teachers may be able to give general judgments, but judgments are more likely to be accepted and understood by others when they are supported by detailed illustrations.
>
> Recent research supports the important emphasis of learnings acquired at an early age. This fact, coupled

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[2]Thompson, Ethel, "Why Kindergarten is the Crucial Year," Grade Teacher, December, 1965.

> with the recent emphasis on programs for disadvantaged, has helped to put increasing importance on kindergarten, and it has intensified the competition for the tax dollar.
>
> No doubt, the competition for funds will continue and, in the end, only those programs whose worth can be substantiated will survive. A challenge to all who are responsible for the kindergarten program is the systematic assessment of the work they are doing. The degree to which this challenge is met may determine whether kindergartens will be made available to all children or will remain the privilege of only about half of the five-year olds in the United States.[3]

Another request for the improvement of the kindergarten program recently appeared in The Elementary Journal entitled, "Are Kindergartens Obsolete?" After tracing the development of today's kindergarten, the writers discuss the current dissatisfaction with the modern kindergarten:

> The resulting dissatisfaction has brought demands for the return of challenging content in kindergarten. This often leads to increased emphasis on 'reading readiness' programs or even on reading instructions.
>
> The early teaching of reading does not seem to provide the final solution to the major problem of kindergarten education. Researchers have yet to report convincing evidence that early instruction makes a difference in later reading competency.

The writers conclude:

> If the modern kindergarten is to survive, it must contribute a greater share to the child's total learning experience. The mechanics of reading may or may not be important for some five-year olds, but the development of basic concepts and verbal and symbolic skills are a necessity for all children.[4]

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[3]Tillman, Rodney, "Assessment at Midpoint", Grade Teacher, December, 1965.

[4]Spodek, B. and Robison, H.F., "Are Kindergartens Obsolete?" Elementary School Journal, March, 1965.

Another article urging that the kindergarten provide more learning appeared in the Educational Digest:

> Why do five-year olds in school seem to lack the creativity and the spontaneity they show when they are playing together without adult interference?
>
> Are we ignoring the abilities of these children? Are we trying to fit them into a standard pattern developed decades ago?
>
> It seems to us that we have neglected to build on the knowledge and the powers that our children already possess. There is more truth than humor in a cartoon that depicts two kindergartners in the schoolyard watching a jet. One is explaining its method of propulsion and the other is saying, 'Come on Henry, it's time to go string those damn beads again.'[5]

A comparison study of first-grade scores on a standardized achievement test between a group of children who had attended kindergarten and another group who had not was reported in The School Executive. Two groups of thirty each were selected by matching mental age scores on the Pintner-Cunningham Primary Mental Maturity Test and also by matching chronological ages. The socio-economic status of each group was thought to be average.

The two groups were compared on the basis of scores on the Metropolitan Readiness Test, Form S. The first grade teachers gave this test in October 1953, January 1954, and April 1954.

The comparisons were made on the basis of average scores of the two groups. The kindergarten group had higher scores

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[5]Van Wise, E.K. and Lammers, Donald, "Are We Being Fair to Our Kindergarteners?", Educational Digest, September, 1965.

in number work and copying in two of the three testings. However, the non-kindergarten group had higher average scores in word meaning and comprehension in all three testings.

The writers conclude that there was no real differences in test performance and indicate that "social adjustment of the child to the school situation is the main reason for having a kindergarten."[6]

B. Review of Tests Used

The achievement test used in the Charleston School District which provided the achievement scores used in this study is the California Achievement Test, 1957 Edition. In a review of this test, Charles Neidt commented:

> The 1957 edition of the California Achievement Test represents a well constructed achievement test battery designed to measure the basic fundamentals of reading, mathematics, and language from grades 1 through 14. This test battery has many desirable features and can be recommended for the measurement of general achievement at the grade levels indicated.[7]

Grade equivalent scores are reported for Reading (Vocabulary and Comprehension), Arithmetic (Fundamentals and Reasoning), Spelling and Language. The test does not report a total grade equivalent score. The test does report a Total Reading and a Total Arithmetic score but only the subscores for Reading Vocabulary, Reading Comprehension, Arithmetic Fundamentals, and Arithmetic Reasoning are recorded on the cumulative records in the Charleston School District.

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[6]Bergamin, Y., and Swanson, W., "Does Kindergarten Make a Difference?", The School Executive, December, 1954.

[7]Buros, Oscar K., Editor, Mental Measurements Yearbook, 5th Edition, The Gryphon Press, Highland Park, New Jersey, 1959.

The I.Q. score in the first grade was obtained from the Detroit Advanced First Grade Intelligence Test. In a review of this test, A.J. Jordan states:

> The purpose of this test is to furnish an instrument for measuring the un-classified pupils of the first grade and those of the low second. Seven tests constitute the whole. In none of the tests is reading required. The recognition of printed numbers is demanded in all to designate the number of items to be counted. The tests are the usual ones; marking drawings on objects from their names and from a description of them; discovering similarities; drawing in missing parts; recognizing one object among five others, recognizing parts of objects from their description, recognizing printed numerals up to 18 and then the counting designated number of objects.
>
> As a whole, the test will find a useful niche in the testing of young children.[8]

The I.Q. scores obtained at the third and fifth grade levels were obtained from the California Short Form Test of Mental Maturity, S-Form, 1957. In a review of this test, Cyril Burt comments:

> This is an abridgement of the earlier California Test of Mental Maturity and is described as an 'instrument for appraising mental development or mental capacity.' The whole scale comprises six booklets of increasing difficulty designed to cover the entire range of school grades from the pre-primary to the adult level. Each booklet contains seven sub-tests which sample four main areas of mental activity (termed mental factors) spatial relationships, logical reasoning, numerical reasoning, and verbal concepts.
>
> In the original form, the conceptual framework for the California Test of Mental Maturity was that of the Stanford-Binet scale. The further revision has been in use for over twenty years. The experience and the mass of the data accumulated have been freely utilized in progressively improving the shortened series. The outcome is one of the best sets of group tests at present available.[9]

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[8]Buros, Oscar K., Editor, Mental Measurements Yearbook, 2nd Edition, The Gryphon Press, Highland Park, New Jersey, 1940.

[9]Buros, Oscar K., Editor, Mental Measurements Yearbook, 5th Edition, The Gryphon Press, Highland Park, New Jersey, 1950.

C. Grading System

The normal A, B, C, D, and F letter grading system is employed in the Charleston School District.

CHAPTER III

RESULTS

A statistical analysis comparing the two groups was made. The group that attended kindergarten and the group that did not attend kindergarten were compared on the basis of letter grades in Reading, Arithmetic, Spelling, Application, and Conduct in grades 1, 3, and 6, achievement test scores in Reading and Arithmetic in grades 2, 4, 6, and I.Q. scores in grades 1, 3, and 5.

A. Summary of Results

Thirty separate comparisons between the two groups, K (the students that attended kindergarten) and NK (the students that did not attend kindergarten). In eleven of the thirty comparisons, the difference between the two groups was significant at the 0.05 level.

> The conventional definition of a rare event is an event which has a probability not greater than 0.05. Such an event would occur by chance no more often than five times in 100 experiments, and such an event is said to be significant at the 0.05 level.[1]

Two of the significant differences occurred at the First Grade level, one at the Second Grade, one at the Third Grade, one at the Fifth Grade, and interestingly, six of the

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[1]McCollough and Van Atla, Statistical Concepts, New York: McGraw-Hill Book Company, 1963.

significant differences occurred at the Sixth Grade level.

B. Chart of Results

The results of the study are summarized on the chart following. The compared areas which showed a difference significant at the 0.05 level are underlined. LG stands for letter grade.

1st Gr.	Reading LG	Arith. LG	Spelling LG	Conduct LG	Application LG	I.Q. Score
2nd Gr.	Reading Vocabulary Achievement	Reading Comprehension Achievement	Arithmetic Fundamentals Achievement	Arithmetic Reasoning Achievement		
3rd Gr.	Reading LG	Arith. LG	Spelling LG	Conduct LG	Application LG	I.Q. Score
4th Gr.	Reading Vocabulary Achievement	Reading Comprehension Achievement	Arithmetic Fundamentals Achievement	Arithmetic Reasoning Achievement		
5th Gr.						I.Q. Score
6th Gr.	Reading LG	Arith. LG	Spelling LG	Conduct LG	Application LG	
	Reading Vocabulary Achievement	Reading Comprehension Achievement	Arithmetic Fundamentals Achievement	Arithmetic Reasoning Achievement		

C. Review of Specific Results

The results of each comparison will be reviewed briefly. In the areas compared that involved numberical scores (achievement and I.Q. tests) the value of t which was derived will be given, the mean and the range of each group (K and NK), and whether the difference between the two means is significant at the 0.05 level or not. $\bar{X}K$ will represent the mean of the group that attended kindergarten, $\bar{X}NK$ will represent the mean of the group that did not attend kindergarten, r will represent range.

First Grade I.Q. Score

$t = 1.478$
$\bar{X}_K = 113.19$, r = 82-135
$\bar{X}_{NK} = 108.31$, r = 87-133

The difference in the two means is not significant at the 0.05 level.

Second Grade Reading Vocabulary Achievement[1]

$t = 1.802$
$\bar{X}_K = 3.59$, r = 2.0-4.8
$\bar{X}_{NK} = 3.35$, r = 1.9-4.4

The difference in the two means is not significant at the 0.05 level.

Second Grade Reading Comprehension Achievement

$t = .764$
$\bar{X}_K = 4.33$, r = 2.7-5.0
$\bar{X}_{NK} = 4.22$, r = 2.0-4.8

The difference in the two means is not significant at the 0.05 level.

Second Grade Arithmetic Fundamentals Achievement

t was not calculated due to the very slight (0.01) difference between the two means.
$\bar{X}_K = 3.86$, r = 2.9-4.4
$\bar{X}_{NK} = 3.87$, r = 2.4-5.2

It can reasonably be assumed that there is no significant difference between the two means. This is the only comparison in which the mean score of the NK group was higher than the mean score of the K group.

Second Grade Arithmetic Reasoning Achievement

$t = 2.937$
$\bar{X}_K = 4.12$, r = 3.1-5.5
$\bar{X}_{NK} = 3.62$, r = 1.9-4.2

The difference is significant at the 0.05 level.

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[1]Achievement scores reported as grade equivalents.

Third Grade I.Q. Score

t = 1.189
$\bar{X}K$ = 108.96, r = 97-140
$\bar{X}NK$ = 104.74, r = 85-127

The difference is not significant at the 0.05 level.

Fourth Grade Reading Vocabulary Achievement

t = 1.865
$\bar{X}K$ = 5.33, r = 2.8-6.7
$\bar{X}NK$ = 4.79, r = 2.4-8.7

The difference in the two means is not significant at the 0.05 level.

Fourth Grade Reading Comprehension Achievement

t = 1.652
$\bar{X}K$ = 5.55, r = 4.1-6.3
$\bar{X}NK$ = 5.17, r = 3.06-6.4

The difference in the two means is not significant at the 0.05 level.

Fourth Grade Arithmetic Fundamental Achievement

t = 1.555
$\bar{X}K$ = 5.60, r = 4.0-6.3
$\bar{X}NK$ = 5.32, r = 3.8-6.7

The difference in the two means is not significant at the 0.05 level.

Fourth Grade Arithmetic Reasoning Achievement

t = .789
$\bar{X}K$ = 5.62, r = 4.3-6.9
$\bar{X}NK$ = 5.46, r = 3.6-6.5

The difference in the two means is not significant at the 0.05 level.

Fifth Grade I.Q. Score

t = 2.557
$\bar{X}K$ = 116.37, r = 94-130
8 $\bar{X}NK$ = 106.07, r = 73-131

The difference in the two means is significant at the 0.05 level.

Sixth Grade Reading Vocabulary Achievement

t = 2.522
$\bar{X}K$ = 7.60, r = 6.1-9.0
$\bar{X}NK$ = 6.97, r = 4.6-9.0

The difference in the two means is significant at the 0.05 level.

Sixth Grade Reading Comprehension Achievement

t = 1.849
$\bar{X}K$ = 7.24, r = 4.0-9.4
$\bar{X}NK$ = 6.74, r = 3.7-9.7

The difference in the two means is not significant at the 0.05 level.

Sixth Grade Arithmetic Fundamentals Achievement

t = 4.391
$\bar{X}K$ = 8.20, r = 5.0-10.3
XNK = 7.29, r = 4.8-10.4

The difference in the two means is significant at the 0.05 level.

In the areas compared that involved letter grades, the value of X^2 (chi-square) which was derived will be given, the contingency table that the X^2 was derived from will be given, and whether the difference in the two sets of grades is significant at the 0.05 level.

First Grade Reading Letter Grade

X^2 = 10.062

The difference in the two sets of grades is significant at the 0.05 level.

		A	B	C	D	F
(attended kindergarten)	K	14	9	3	1	0
(no kindergarten)	NK	28	55	32	6	0

First Grade Spelling Letter Grade

X^2 = 6.600

The difference in the two sets of grades is not significant at the 0.05 level.

	A	B	C	D	F
K	18	6	3	0	0
NK	50	36	24	6	4

First Grade Conduct Letter Grade

X^2 = 1.844

The difference in the two sets of grades is not significant at the 0.05 level.

	A	B	C	D	F
K	18	6	3	0	0
NK	50	36	24	6	4

First Grade Arithmetic Letter Grade

X^2 = 11.613

The difference in the two sets of grades is significant at the 0.05 level.

	A	B	C	D	F
K	16	10	1	0	0
NK	47	35	34	6	4

First Grade Application Letter Grade

X^2 = 5.164

The difference in the two sets of grades is not significant at the 0.05 level.

	A	B	C	D	F
K	12	9	5	0	0
NK	35	37	46	5	0

Third Grade Reading Letter Grade

X^2 = 6.071

The difference in the two sets of scores is not significant at the 0.05 level.

	A	B	C	D	F
K	10	11	4	2	0
NK	27	41	40	15	1

Third Grade Arithmetic Letter Grade

X^2 = 7.722

The difference in the two sets of scores is not significant at the 0.05 level.

	A	B	C	D	F
K	11	10	3	1	1
NK	27	49	32	16	2

Third Grade Spelling Letter Grade

X^2 = 7.37

The difference in the two sets of scores is not significant at the 0.05 level.

	A	B	C	D	F
K	19	3	3	1	0
NK	56	40	22	6	1

Third Grade Conduct Letter Grade

X^2 = .960

The difference in the two sets of scores is not significant at the 0.05 level.

	A	B	C	D	F
K	11	11	3	1	0
NK	43	53	22	7	0

Third Grade Application Letter Grade

X^2 = 10.343

The difference in the two sets of scores is significant at the 0.05 level.

	A	B	C	D	F
K	16	9	4	2	0
NK	39	57	18	11	0

Sixth Grade Reading Letter Grade

X^2 = 13.042

The difference in the two sets of scores is significant at the 0.05 level.

	A	B	C	D	F
K	12	9	4	2	0
NK	21	34	44	24	1

Sixth Grade Arithmetic Letter Grade

X^2 = 28.673

The difference in the two sets of scores is significant at the 0.05 level.

	A	B	C	D	F
K	17	15	1	2	0
NK	11	29	50	20	8

Sixth Grade Spelling Letter Grade

X^2 = 9.520

The difference in the two sets of scores is significant at the 0.05 level.

	A	B	C	D	F
K	17	4	4	1	0
NK	43	46	20	13	2

Sixth Grade Conduct Letter Grade

X^2 = 3.715

The difference in the two sets of scores is not significant at the 0.05 level.

	A	B	C	D	F
K	15	10	1	1	0
NK	60	37	22	4	0

Sixth Grade Application Letter Grade

X^2 = 7.021

The difference in the two sets of scores is not significant at the 0.05 level.

	A	B	C	D	F
K	10	10	6	1	0
NK	19	56	36	11	1

CHAPTER IV

CONCLUSIONS AND RECOMMENDATIONS

A. Conclusions

From the results of this study, certain conclusions can be drawn. Again, the reader should remember that these conclusions are applicable only to the group studied and may or may not hold true for other groups.

There is not a significant difference between the group that attended kindergarten and the group that did not attend kindergarten in the following areas: Spelling Letter Grades in Grades 1 and 3, Arithmetic Letter Grades in Grade 3, Reading Letter Grades in Grade 3, Conduct Letter Grades in Grades 1, 3, and 6, Application Letter Grades in Grades 1 and 6, I.Q. scores in Grades 1 and 3, Reading Vocabulary Achievement in Grades 2 and 4, Reading Comprehension Achievement in Grades 2, 4, and 6, Arithmetic Fundamentals Achievement in Grades 2 and 4, Arithmetic Reasoning Achievement in Grade 4.

There is a significant difference between the two groups in these areas: Reading Letter Grades in Grades 1 and 6, Arithmetic Letter Grades in Grades 1 and 6, Application Letter Grades in Grade 3, I.Q. scores in Grade 5, Reading Vocabulary Achievement in Grade 6, Arithmetic Fundamentals Achievement in Grade 6, and Arithmetic Reasoning Achievement in Grades 2 and 6.

B. Recommendations

The results of this study suggest several possible areas of further research. A later follow-up of these two groups in high school and a later follow-up of those of the two groups who continue their education beyond high school could shed more light on whether there is a relationship between kindergarten attendance and various areas of later academic achievement.

Repetition of studies similar to this one conducted at several intervals could show if the significant differences found in the various areas in this study would show up consistently, or if these significant differences were only applicable to the two groups compared in this study.

If the Charleston Community School District #1 initiates a public kindergarten system as is now being proposed, comparisons could be made between the achievement of private kindergarten children and public kindergarten children.

Many educators strongly advocate kindergarten programs. Voters asked to finance these programs might do so more readily if they had objective results of the programs.

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